Pt. Ravishankar Shukla University
Raipur 492 010, Chhattisgarh

Syllabus

Choice Based Credit System
in
Biotechnology
(Program Code : 0408)

Session
2025-2026, 2026-2027

Approved by

Board of Studies : Biotechnology

Date : 21/05/2025

Name of Chairman : Prof. Keshav Kant Sahu

Name of Members : Prof. Ajaya Qureishi

: Dr. Sayal Saya Deo

: Dr. Bharti Sahu

: Dr. Nagendra K. Chandrakar KHEMRAJ

Ankita Rathi

Generic Elective Courses: (Offered to PG students of other Departments/SoS only)

Semester	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
						CIA	EA	Total
II	BTGEC201	Basic Biotechnology	T	3	3	30	70	100
III	BTGEC301	Applications of Biotechnology	T	3	3	30	70	100
T- Theory, P- Practical								

Program Learning Outcomes for CBCS in Biotechnology

Under this scheme, students of other streams if opt "Biotechnology" as a subject of choice;

1. Will develop basic understanding about the subject and become aware of the progression made in realm of biotechnology.
2. Will have knowledge about importance and applications of the biotechnology in the day-to-day life and betterment of society.
3. Basic understanding regarding this subject may possibly help them to opt biotech-related marketing, customer support services, back-office support system, policy-making field, *etc*., as a profession for their livelihood.

Semester- Second

Program	Subject	Year	Semester
MSc (CBCS)	**Biotechnology**	**1**	**II**
Course Code	Course Title		Course Type
BTGEC201	**Basic Biotechnology**		**Generic Elective**
Credit	Hours Per Week (L-T-P)		
	L	T	P
3	**3**	**-**	**-**
Maximum Marks	CIA		EA
100	**30**		**70**

L- Lecture, T- Tutorial, P- Practical

Detailed Syllabus

1. Introduction of biotechnology; aims & scope of biotechnology.
2. Different areas of biotechnology; application of biotechnology & future prospects.
3. Structure of prokaryotic and eukaryotic cells; comparison between plant and animal cell.
4. Function of cell organelles: Nucleus, Mitochondria, Golgi-complex, Endoplasmic reticulum, etc.
5. Macromolecules in biological system: Amino acids; DNA & RNA; structure and function.
6. Carbohydrate; structure, classification, properties and function.
7. Protein; primary, secondary, tertiary & quaternary structure of protein and their importance.
8. Lipid; structure, classification and function.
9. Introduction and scope of microbiology; general account of Bacteria, Fungi and Virus.

Note: There will be five questions of equal marks with intermittent choice.

21/5/25

Books:

1. Pelczar, M.J. Jr., Chan, E.C.S. & Kreig, N.R. (2009). Microbiology, Tata McGraw Hill.
2. Prescott L.M., Harley J. & Klein D. (2001). Microbiology, McGraw Hill 5th Edition.
3. U. Satyanarayana, First Edition: 2005, reprint (2010). Biotechnology, Books and Allied (P) Ltd. Kolkata.
4. C.B. Powar (2005). Cell Biology, Third edition, reprint Himalaya Publishing House.
5. Nelson &Cox (2009). Principal of Biochemistry, 5th edition.
6. Voet D., Voet J.G. & Pratt C.W. (2006). Fundamentals of Biochemistry, 2nd Edition. Wiley.
7. Gerald Karp (2007). Cell and Molecular Biology, 5th edition.
8. Geoffrey M. Copper & Robert E. Hausman (2009). The Cell: A Molecular Approach.

Learning Outcomes:

1. Student will gain basic idea of different aspects and applications of biotechnology in various sectors.
2. Student will acquire basic understanding regarding biochemistry, tissue culture, cell biology, molecular biology, etc.

Employability/ Skill Development:

1. Students will gain necessary understanding and will possibly be able to develop skills in the various fields of biotechnology.
2. Students will be able to employ the gathered technical skills on biotechnological processes and entrepreneurship programs.

Semester- Third

Program	Subject	Year	Semester
MSc (CBCS)	**Biotechnology**	**1**	**II**
Course Code	Course Title		Course Type
BTGEC301	**Applications of Biotechnology**		**Generic Elective**
Credit	Hours Per Week (L-T-P)		
	L	T	P
3	**3**	**-**	**-**
Maximum Marks	CIA		EA
100	**30**		**70**

L- Lecture, T- Tutorial, P- Practical

Detailed Syllabus

1. Introduction of bioprocess technology: isolation, screening, identification, preservation and maintenance of industrially important microorganisms; applications of bioprocess technology.
2. Pharmaceutical biotechnology: antibiotic production.
3. Plant tissue culture techniques: basic media and nutrients, micro-propagation, multiplication, acclimatization, poly house, net house, green house.
4. Genetic engineering: introduction, tools & techniques, transgenic plants.
5. Environmental pollution: air, water and soil pollution; different biotechnological approaches for the prevention& control of environment pollution: bioremediation, phytoremediation, sewage and effluent treatment.
6. Bioinformatics: general introduction, website and online tools of bioinformatics; application of bioinformatics.
7. Animal biotechnology: general introduction, tools & techniques, applications.
8. Transgenic animal and cloning techniques.

Note: There will be five questions of equal marks with intermittent choice

Books:

1. Prescott L.M., Harley J., Klein D. (2001). Microbiology, McGraw Hill 5th Edition.
2. U Satyanarayana, First Edition: 2005, reprint (2010). Biotechnology, Books and Allied (P) Ltd. Kolkata.
3. Gerald Karp (2007). Cell and Molecular Biology, 5th edition.
4. L.E. Casida (1994). Industrial Microbiology edition.
5. H.S. Chawla- Introduction of Plant Biotechnology, Oxford & IBH Publishing Co. (P) Ltd. 3rd edition.
6. Razdan M.K. (2010). Introduction of Plant Tissue Culture, 2nd edition, Oxford & IBH Publishing Co. (P) Ltd.
7. Bhojwani SS and Razdan MK (1996). Plant Tissue Culture; Elsevier.
8. Geoffrey M. Copper, Robert E. Hausman(2009). The Cell: A Molecular Approach.
9. TA Brown (2005) Gene Cloning and DNA Analysis, 4th Edition.
10. InduShekher Thakur (2006). Environmental Biotechnology: Basic concepts and Application, first edition, I.K. International Pvt. Ltd.
11. Gareth G. Evans, Judy Furlong (2011). Environmental Biotechnology: Theory and Application, 2nd edition, John Wiley and Sons.
12. Stanbury and Whittaker – Principles of Sterilization techniques, first Indian reprint edition (1997)., Aditya Book (P) Ltd. New Delhi.
13. C.S.V. Murthy (2003). Bioinformatics. First Edition, Himalaya Publishing House.
14. S.C. Rastogi, Namita Mendiratta, Parag Rastogi (2003). Bioinformatics: Concepts, Skills and Applications, CBS Publishers and Distributors, New Delhi.
15. B.D. Singh (2004). Biotechnology: An Expanding Horizons, 1st Edition.

Learning Outcomes:

1. Students will imbibe knowledge regarding applied aspects of different fronts of biotechnology.
2. Students will gain idea about transgenics/ GMOs, bioinformatics, bioprocess and culture techniques.

Employability/ Skill Development:

1. This course will enrich domain specific knowledge of the students, and develop skills on various fields of biotechnology.
2. Students will be able to go for a kind of small to medium range start-up programs, and will be capable to serve in biotechnology based industries.